

## CHAPTER IX

# The Cutback in Production Goals

The unfavorable balance between deliveries and stated requirements which characterized the Engineer procurement program in the fall of 1942 was far from unique. The crisis in production was general, making imperative a re-examination of overall objectives.

### *Attempts To Reduce the Army Supply Program*

For a number of months SOS had been trying and had by the end of the summer of 1942 at least partially succeeded in cutting down on quantities of Class II equipment.<sup>1</sup> In insisting that requirements be revised downward SOS was carrying out a policy first announced by the War Department in the fall of 1941 and reiterated in December of that year. T/BA's would be studied carefully "with a view to eliminating therefrom all items which are not absolutely essential for combat"—in particular allowances of motor vehicles and other bulky equipment which consumed large amounts of cargo space.<sup>2</sup> Again in June 1942 the Chief of Staff instructed his Operations Division to review T/BA's. The Requirements Division, SOS, had meanwhile attacked the problem and could report "substantial reductions," among them a cut in engineer requirements for searchlights, ponton boats, and 6-ton pneumatic floats. Clay assured Somervell that the Requirements Division, SOS, would continue to press the services for further re-

ductions and he expected forthcoming cuts to offset to a large extent the impending increase in the troop basis. This generalization did not hold true for the Engineers, although quantities of construction machinery on the T/BA were reduced. As the Supply Division stated repeatedly, engineer requirements were geared to the character of military operations rather than to the number of men in the Army. The effect of reductions in organizational equipment was therefore to shift requirements from Class II to Class IV rather than to eliminate them.<sup>3</sup>

At the same time that the Requirements Division, SOS, was calling for reductions in the T/BA, it carried on a campaign for a re-examination of replacement and distribution factors. The application of percentages to amounts of initial issue in order to insure replacement of equipment upon its wearing out, destruction, or loss and to provide a sufficiency in the supply pipeline to insure a constant flow accounted for a large proportion of total requirements. In

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<sup>1</sup> Leighton and Coakley, *Global Logistics*, pp. 302-03.

<sup>2</sup> Ltr, TAG to CofEngrs *et al.*, 31 Dec 41, sub: Reduction of Equip Included in T/BA 1 Oct 41. AG 400.34, Pt. 39A.

<sup>3</sup> (1) Memo, Somervell for Clay, 14 Jun 42. AG 400 (4-17-42), Sec. 1. (2) Memo, Clay for Somervell, 17 Jun 42, sub: Reduction in Rqmts and Prod Programs, with Incl, Tab B. Same file. (3) T/BA 5, 1 Jun 42, 1 Dec 42. (4) Ltr, Dawson to Actg C of EHD, 31 Mar 55.

1942, 55 percent of the ASP was in replacement and distribution. Naturally the Requirements Division, SOS, regarded this area as a fertile one for further cuts. The Supply Division, OCE, had its own reasons for failing to exhibit a corresponding enthusiasm.<sup>4</sup>

When in April 1942 SOS made its first inquiry about replacement and distribution factors, Fowler readily owned that replacement factors had not been revised since 1938 and strongly implied that they need not be in the foreseeable future. The current factors were 1 percent for all nonexpendable items in the zone of interior and 10 percent in theaters of operations. The Engineers had no experience on which to base a revision, Fowler argued. SOS should banish the fear that overprocurement might result from the application of unrealistic factors. Admitted, the Supply Division employed them in computing requirements. Admitted, the Supply Division purchased quantities to cover the replacement factor on initial issues. But replacement factors did not enter into buying thereafter. Subsequent purchases were "guided by actual needs to preserve stock levels, and not by the application of factors," Fowler explained. He declared further that replacement factors had little effect on issues to theaters of operations, their use being limited to establishing an initial reserve. Issues to maintain this reserve were based upon "the military situation."<sup>5</sup>

Although Fowler did not mention the fact at this time, the Engineers were relying heavily upon replacement factors to insure the shipment of sufficient quantities of engineer matériel. Because of the shortage of shipping space, very little Class IV equipment was being loaded. Top priority was going to the shipment of Class II supplies for units embarking for overseas. The extra al-

lowances which accompanied units as a result of the application of replacement factors partially compensated for badly needed Class IV equipment which could not be shipped. Once this equipment was delivered, theater engineers could and did put it to work without regard to its original status as a reserve. As Chorpening later expressed it, the Engineers felt that the replacement factor was "fundamentally '*a means to an end*' and should not be considered otherwise."<sup>6</sup>

As for distribution factors, the Engineers had made no separate computation and saw no need for any. "Because Engineer supply functions are now in operation," Fowler argued, "because increases in issue will not produce proportionate increases in necessary echelons of stock, and because the uncertain precision of maintenance [replacement] factors for engineer equipment does not justify the refinement of a relatively small distribution factor, distribution factors are not considered justified or workable."<sup>7</sup> The character of operations, not the number of men involved, determined the quantity of engineer supplies needed. Currently much engineer equipment was being shipped direct to the using organization or to a port.

<sup>4</sup> Rqmts Div ASF, Manual, Jul 43, sub: Determination and Use of Maint Factors and Distr. EHD files. The term "maintenance factor" was used at this time to describe what was subsequently termed "replacement factor." The latter usage has been employed throughout the text in order to avoid confusion.

<sup>5</sup> Memo, C of Rqmts Div SOS for CofEngrs, 6 Apr 42, sub: Rev of Maint and Distr Factors, with 1st Ind, 4 May 42. 400, Pt. 2.

<sup>6</sup> Ltr, ExO Sup Div to Dir Rqmts Div ASF, 4 May 43, sub: Maint Factors for Constr Equip. 400.4.

<sup>7</sup> 1st Ind, 4 May 42, Fowler for C of Rqmts Div SOS, on Memo, C of Rqmts Div SOS for CofEngrs, 6 Apr 42, sub: Rev of Maint and Distr Factors. 400, Pt. 2.

For all these reasons the Supply Division felt it unnecessary to render more than *pro forma* compliance with the request of SOS for a revision of replacement and distribution factors. Setting aside the prescribed forms, the Supply Division drew up a substitute which took account only of replacement factors. Reductions from the standard 10 percent were made in a number of cases, chiefly on heavy expensive machinery intended for use in rear areas.<sup>8</sup>

The Requirements Division, SOS, insisted that the Supply Division could and must do better. The durability and length of service of engineer items were bound to vary considerably more than was indicated by the monotonous uniformity of the factors. Further refinement of replacement factors and assignment of a distribution factor to all items destined to be stocked was essential for the planning and computation of requirements. Having been led to water the Engineers merely pretended to drink.<sup>9</sup>

The Supply Division placed the unwanted job in charge of 1st Lt. Warren S. Davis, who had no experience or training to qualify him for it. The factors he worked up varied considerably from one category of equipment to another. Bridging was assigned a replacement factor of 2 percent for the zone of interior, 6 percent in theaters of operations. Construction machinery received 2 percent in the zone of interior and 8 percent overseas. A distribution factor of 20 percent was assigned for bridging, and 10 percent for construction machinery.<sup>10</sup>

Although SOS approved the new factors in mid-July, its Requirements Division served notice in September of its intention to force periodic adjustments. Davis, who represented the Supply Division at a meeting called to discuss the subject, became deeply disturbed as SOS unfolded its plans

and he recalled the circumstances under which the engineer factors had been developed. His own ignorance of the subject uppermost in his mind, he was dazzled by the brilliance of the seventy-five-page report prepared for the Ordnance Department by a board of seven lieutenant colonels. Back at his desk, he strongly recommended that the Engineers change their attitude and appoint a full-time staff to work on the subject as Ordnance had done instead of engaging in "sporadic bursts of attention and energy when such is called for by higher authority." The Supply Division shelved the lieutenant's recommendations, determined to postpone as long as possible the day when the Engineers might be forced to relinquish what had become an important safety valve in overseas supply.<sup>11</sup>

#### *Tightening Controls on International Aid*

Another important consequence of the failure to meet production goals was a less liberal attitude in dispensing international aid. By September Somervell and Clay had established the firmer controls over international aid that both desired and they supported the International Division, SOS, in a drive for improvements in administration. Within the Corps of Engineers international aid had been administered from a section of the Requirements Branch under Colonel Molnar. In response to a directive from SOS on 23 September, the International Aid Section was named a branch of the Supply Division with the understanding that Mol-

<sup>8</sup> *Ibid.*, with Incl, 1 May 42, 400, Pt. 2.

<sup>9</sup> 2d Ind, 9 May 42, on memo cited n. 7.

<sup>10</sup> (1) Memo, AC of Rqmts Br for C of Opns Sec, 21 Sep 42, sub: Maint and Distr Factors. 400.4, Pt. 1. (2) Maint and Distr Factors Approved by SOS, 15 Sep 42, 400, Pt. 2.

<sup>11</sup> Memo cited n. 10 (1).

nar would continue to report to his old boss, Dawson, in the latter's position as assistant executive officer of the Supply Division. None of the other branch chiefs went through this channel.<sup>12</sup>

This unique administrative arrangement was part of Fowler's plan for subordinating international aid to the needs of the American Army, a plan he spelled out on 14 October in a confidential memorandum to Dawson, Molnar, and Col. Beverly C. Snow, an Engineer officer recently assigned to study the international aid setup. Fowler wrote:

a. Recommendations to International Supply Committee regarding requests for procurement of supplies:

(1) The item must be an Engineer item in our Service. (Pipe lines and canning plants excepted).

(2) The item must be for the prosecution of military operations in a Theater as distinguished from farming, manufacturing and resource development.

(3) The quantity recommended for approval must be justified by the size of the military force involved.

(4) Procurement will not necessitate the dropping of essential items from the U. S. procurement program.

b. Recommendations to Munitions Assignments Committee reference withdrawal from U. S. stocks.

(1) Non Common Stock Pile Items.

(a) If a troop item, it must be destined for use by troops.

(c) For any equipment, the amount recommended for withdrawal will not so deplete stock as to delay the equipping of U. S. troops or the filling of requisitions for active U. S. Theaters. Weight will be given to the relative activity in the proposed foreign theater and the U. S. theater to be deprived of equipment.

(2) Common Stock Pile Items.

(a) To a reasonable extent, the British have a "lien" on existing stocks,

in that they were told that these stocks would be available to them in lieu of purchases that might have been made with Lend Lease funds but under a lower priority.

(b) The proposed use must be in direct connection with military operations.

(c) The quantities to be permitted to be withdrawn at any one time shall be in proper proportion to those used by our troops for similar operations, and shall not so deplete stocks as to delay the filling of requisitions, on hand and anticipated, for *active* U. S. Theaters. For the present all U. S. Theaters will be considered *active* except the Caribbean Theater.

(d) In event the replacement of items withdrawn from U. S. stock for Lend Lease becomes difficult by reason of action of A. and N. B., allocations by W. P. B. or other causes, a less liberal policy than above described will be followed.<sup>13</sup>

This was a tough policy, and Fowler was called upon to defend it almost immediately. On 21 October Snow submitted a report of his observations. He had talked to many persons in SOS, in other services, and to Brigadier Blood. He had studied the organization charts and the flow of paper across the desks in the International Aid Branch. He was convinced that the Engineers were in effect slighting international aid. He believed they should create an International Division at staff level to handle broad policy matters and free the International Aid Branch from Dawson's control. Unless the Chief of Engineers took this step or some-

<sup>12</sup> (1) Leighton and Coakley, *op. cit.*, pp. 261-62. (2) OCE Memo 191, 23 Sep 42, sub: Estab of Intl Br. (3) Snow Rpt. (4) Memo, Fowler for Col Tulley, 22 Oct 42, sub: Intl Aid. 400.333, Pt. 1.

<sup>13</sup> Memo, Fowler for Snow, Dawson, and Molnar, 14 Oct 42. Intl Div file, 400.312.

thing very like it, Snow warned, "it is probable that he will receive a directive from the Commanding General, Services of Supply . . . ." As if the threat of a directive from Somervell were not enough, Snow hinted darkly at troubles from another quarter. The British wanted more direct access to persons in OCE. They wanted a relaxation of specifications. They wanted less red tape in the Engineer Subcommittee. According to Snow, it was only the good offices of Brigadier Blood which had "persuaded a certain Minister to withhold representations on high levels concerning inability to obtain satisfactory action on Engineer items of International aid." Although Snow agreed that American troops should not do without, he felt that the British should be accorded "more consideration." Certainly they should be told why their requisitions could not be filled. Unless these steps were taken and Brigadier Blood's recommendations acceded to, he predicted "a serious rift" in what he termed "the present harmonious relations" between the Corps of Engineers and the Office of the Chief Engineer, British Army Staff.<sup>14</sup>

The Snow report itself came as close to producing a rift as any conditions described therein. Fowler was outraged:

Great stress is placed on the statements of the Chief Engineer, British Army Staff, to the effect that the British are not getting the supplies they need because the Chief of the Supply Division places the needs of the American Army ahead of British needs. . . . The recommendations of the Supply Division before the Munitions Assignments Committee have consistently followed the policies of that committee and their policies are certainly the policies of the War Department. Unless these policies are changed, the Chief of Engineers is bound to look after the needs of the American Army first and it would be most unwise to have a "high level" coordinating officer

make recommendations contrary to those of the Chief of the Supply Division.<sup>15</sup>

Fowler stated he knew of no instance when the British had not been told why their requisitions had been turned down. The British were perfectly free to contact officers in the Supply Division. He was aware that the Engineers had refused to approve the manufacture of nonstandard articles. He thought Brigadier Blood agreed that such production should be avoided in order to simplify the supply and maintenance of equipment. There had been disagreement over an Australian requisition for a million dollars worth of tractor spare parts. Blood had agreed with Molnar's view that the request was far in excess of actual need, that \$300,000 worth of spare parts previously supplied was sufficient. "As a matter of fact, the British are getting a better deal than they could reasonably hope for under Lend Lease priorities through their interest in the 'Common Stock Pile,' " Fowler asserted. "However, if they continue to create trouble as indicated by the statements in this report, I am inclined to recommend the discontinuance of the 'Common Stock Pile' plan and to let the chips fall where they may, i. e., let the International Aid and the Munitions Assignments Committee decide each of their requests; we will merely state facts as to availability of stocks and materials." Fowler declared he would, however, issue orders to make the International Aid Branch independent in fact. Under the new setup Molnar would secure information about requirements from Dawson, about procurement from Seybold, and about specifications from Besson. He, Fowler, would pass upon all recommendations submitted by Molnar.

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<sup>14</sup> Snow Rpt.

<sup>15</sup> Memo, Fowler for Tulley, 22 Oct 42, sub: Intl Aid. 400.33, Pt. 1.

"I cannot agree," he concluded, "that the recommendations coming from the Chief's office should represent the opinion of an officer who is in no way responsible for the supply of our forces. I do not believe that the War Department would want such recommendations."<sup>16</sup>

Shortly thereafter the channels through which international aid was to be administered were clarified substantially along the lines Fowler had indicated. Although the declared intention was to set up the International Aid Branch as a co-ordinate branch of the Supply Division, Dawson, as chief of the Requirements Branch, was to recommend action on all requisitions from Allied nations, and the final decision in case he and the chief of the International Aid Branch disagreed was to be made by the chief of the Supply Division or his assistant executive, Dawson. The form had changed; the substance had not.<sup>17</sup>

Once Fowler announced these decisions, the British graciously accepted them. "With my full support," wrote Brigadier Blood on 18 November, "the operation of the Stockpile is now virtually in the hands of the Chief of Engineers; he makes the assignment. . . ." In reality the British had received more than they were able to ship. The purpose of Blood's letter of 18 November was to liberalize the policy whereby equipment not shipped within forty-five days could be reclaimed by the American Army.<sup>18</sup> All told, Great Britain received a total of \$35,499,000 worth of engineer supplies in the calendar year 1942.<sup>19</sup>

#### *Fourth Quarter Production and the Final Reckoning*

With no relief from the tight materials situation in sight, the Engineers entered the

fourth quarter of 1942 with a procurement program that was swollen by the sharp rise in their troop basis. In May the Engineer program had stood at \$939,600,000. In November, at the very time the total ASP was drastically reduced to bring it into closer balance with production possibilities, the Engineer portion rose to \$1,356,800,000.<sup>20</sup>

Over and above this were Class IV requisitions which were filled on an emergency basis and thus did not appear in the ASP. Efforts to arrive at a more refined estimate of Class IV requirements were doomed to fail in this early stage of the war. Strategic plans were rarely firmed up much in advance of operations. The decision to invade North Africa in November 1942 was not made until late July. Strategists were most reluctant to reveal tentative plans lest they find themselves bound by logistical arrangements that were difficult to alter. There was, moreover, no formal liaison between theater commanders and the supply services. Under such circumstances the Supply Division continued throughout 1942 to purchase much Class IV matériel upon short notice against requisitions forwarded by O&T. Unavoidable as it was, the practice of purchase by requisition constituted a

<sup>16</sup> *Ibid.*

<sup>17</sup> (1) OCE Memo 211, 28 Oct 42, sub: Intl Aid. (2) Memo, C of Sup Div for ExO Sup Div *et al.*, 5 Nov 42, sub: Handling of Intl Matters in Sup Div. Intl Div file, 310.1, Intl Div.

<sup>18</sup> Ltr, Blood to Clay, 18 Nov 42, sub: Engr Equip—Opn of 45-Day Rule. Intl Div file, 400.29, Repossession.

<sup>19</sup> Theodore E. Whiting, Carrel I. Tod, and Anne P. Craft, "Lend-Lease," a chapter in *Statistics*, a volume in preparation for the series UNITED STATES ARMY IN WORLD WAR II, p. 19.

<sup>20</sup> (1) ASP, Sec. I, 6 Apr 42, with changes to 29 May 42, 12 Nov 42, Sec. III, 18 Sep 42. (2) Ltr, Sup Div to C of Prod Br Resources Div SOS, 8 Oct 42, sub: Priorities for Increased Rqmts Required by ASP. Rqmts Br file, 400.1301, Pt. 1.

serious block to the attempts of SOS and of WPB to achieve planned production, which was in turn an essential part of the effort to get on top of the raw materials shortage.<sup>21</sup>

The shortage of steel continued to dominate production during the fourth quarter of 1942. Through the Production Requirements Plan of allocation the WPB succeeded in bringing about a better balance between demand and supply. Since this balance was achieved for the most part by arbitrarily reducing demand, the principal merit of PRP lay in replacing the uncertainty as to whether or not materials would be supplied as needed with the certainty that they would not be. In August Hassinger learned of a proposed 20 percent cut in materials for the tractor industry. He began working for an amendment at once, but all efforts failed. Allocations for the fourth quarter were actually less than anticipated. Tractors suffered a cut of 30 percent; shovels, 25 percent; graders, 35 percent; engines for construction machinery, 10 percent.<sup>22</sup>

At the same time that the Supply Division protested these cuts to SOS, it advised the field procurement offices to make the best of them. The WPB had done a "good job," the Procurement Branch informed the six procurement districts in mid-October. Some curtailment of production would result and some confusion in scheduling would exist at first. It could be expected that "many companies will 'cry on your shoulder.'" The procurement districts should take pains to explain the necessity to balance demand and supply. They should be alert but not too hasty in filing applications for additional materials from the reserve "kit" that WPB had established for proven emergencies.<sup>23</sup>

Although by December 1942 monthly deliveries of construction machinery were valued at more than \$35,000,000 as compared with \$8,580,000 the previous January and although the Corps of Engineers had received deliveries to an estimated value of \$254,236,000 during the year, deliveries fell almost 25 percent short of requirements as stated in December 1942. (*Table 7*) Since the December figures were in part at least the result of stating requirements in terms of anticipated production, the actual shortages were doubtless larger than appear in *Table 7*. The following comparison of tractor requirements with deliveries shows a striking difference between what was stated as required, what was believed feasible to produce, and what was finally delivered:<sup>24</sup>

	Total Needs Stated	Total Production Authorized	Require- ments ASP	
Item	April 1942	April 1942	December 1942	Deliveries 1942
D-8 . . . . .	4, 368	2, 560	2, 328	1, 947
D-7 . . . . .	3, 409	2, 900	2, 623	2, 133
D-6 . . . . .	1, 533	1, 800	1, 427	1, 399
D-4 . . . . .	4, 613	5, 500	5, 353	4, 181

<sup>21</sup> (1) Leighton and Coakley, *op. cit.*, pp. 296-97. (2) Rqmts Br Diary, 30 Nov 42.

<sup>22</sup> (1) Smith, *The Army and Economic Mobilization*, Ch. VIII, p. 123. (2) Hassinger Diary, 11 Aug, 6 Oct 42. (3) Memo, C of Equip Control Sec for C of Proc Br, 22 Aug 42, sub: Ltr from W. Blackie, Caterpillar Tractor Co., Aug 19. Exec Office Proc Div file, Tractors, Constr Mach. (4) Ltr, ACofEngrs to CG SOS, 15 Dec 42, sub: Rpt on Deliveries in the Tractor Industry. Mgt Br Proc Div file, Steel.

<sup>23</sup> Ltr, AC of Proc Br to Proc Dists, 17 Oct 42. sub: PRP Activities. Mgt Br Proc Div file, Instructions to Dists, Procedural PRP.

<sup>24</sup> (1) Crawford and Cook, *op. cit.*, p. 16. (2) Chart, Relation of Deliveries to Rqmts, 1942, in CE Conf No. 3, 21 Jan 43. EHD files. (3) Memo, Maj William W. Goodman, Intl Div SOS, for Secy MAC(G), 10 Apr 42, sub: Tracklaying Tractor, Long Range Alloc for Approval. Constr Mach Br file, Second Quarter Alloc, 1942 (Svs Combined).

TABLE 7—CONSTRUCTION MACHINERY ANNUAL REQUIREMENTS AS OF DECEMBER 1942 AND ACTUAL DELIVERIES IN 1942

Item	Requirements as of December 1942	Deliveries During 1942	Over or Short December Requirements
Auger, earth, skid mounted, gasoline engine driven.....	78	46	— 32
Compressors, air			
Trailer mounted, pneumatic tires, diesel engine driven, 315 cubic feet per minute.....	(a)	98	-----
Truck mounted, gasoline engine driven, 105 cubic feet per minute.....	1, 013	775	— 238
Crane, tractor operated, non-revolving, 20-ton, 20-foot boom.....	(a)	226	-----
Cranes and shovels, crawler mounted			
½-cubic yard, 5- to 6-ton, Class II.....	753	329	— 424
¾-cubic yard, 7- to 10-ton, Class III.....	100	47	— 53
1¾- to 2-cubic yard, 30- to 40-ton, Class V.....	(a)	31	-----
Cranes and shovels, rubber tired			
¾-cubic yard, 4- to 8-ton, Class X.....	250	266	+ 16
Crushing and screening plant, 2-unit, gasoline engine driven, semi- trailer mounted, 25 cubic yards per hour.....	40	47	+ 7
Distributor, bituminous material, trailer mounted, 1,250-gallon.....	(a)	220	-----
Ditching machine, ladder type, crawler mounted, gasoline engine driven, digging depth 8 feet, width 18 to 24 inches.....	200	168	— 32
Graders, road			
Motorized, diesel engine driven, 12-foot moldboard.....	1, 388	1, 229	— 159
Towed type, leaning wheel, hand controlled, 12-foot moldboard....	150	179	+ 29
Hammer, gasoline, portable.....	825	555	— 270
Mixers			
Concrete, gasoline engine driven, trailer mounted, 14-cubic foot....	625	328	— 297
Pugmill, with dryer and soil stabilization unit, semitrailer mounted..	50	27	— 23
Rollers, road			
Gasoline engine driven, 3-wheel, 10-ton.....	401	192	— 209
Gasoline engine driven, tandem, 2-axle, 5- to 8-ton.....	300	470	+ 170
Towed type, sheepsfoot, 2-drum-in-line.....	215	341	+ 126
Rooter, road, cable operated, 3-tooth.....	305	405	+ 100
Saw, chain, gasoline engine driven, 36-inch blade.....	1, 850	759	— 1, 091
Scrapers, road			
Towed type, cable operated, 8-cubic yard, Type III.....	(a)	793	-----
Towed type, cable operated, 12-cubic yard, Type IV.....	(a)	723	-----
Semitrailer, low bed, rear loading, with dolly, 20-ton.....	93	16	— 77
Tractors, crawler type, diesel engine driven, complete with accessories			
91 to 140 drawbar horsepower, Class I.....	2, 328	1, 947	— 381
61 to 90 drawbar horsepower, Class II.....	2, 623	<sup>b</sup> 2, 133	— 490
46 to 60 drawbar horsepower, Class III.....	1, 427	<sup>b</sup> 1, 399	— 28
36 to 45 drawbar horsepower, Class IV.....	5, 353	4, 181	— 1, 172
Trailer, full, low bed, 8-ton.....	1, 600	2, 211	+ 611
Welding and cutting set.....	1, 158	1, 191	+ 33

<sup>a</sup> Requirements not shown in available records.

<sup>b</sup> These figures differ from those in Crawford and Cook, *op. cit.*, which have been adjusted to include procurement by the Ordnance Department.

Source: (1) MPR, Sec. 1, Dec 42; 31 Jan 43; 28 Feb 43; 31 Aug 43. (2) Crawford and Cook, *op. cit.*, pp. 25-27.



At the end of the third quarter of 1942 the various claimants for tractors had been shipped the following percentages of their allocations:<sup>25</sup>

<i>Recipient</i>	<i>Percent</i>
Engineer Troops-----	69. 8
Construction Division, OCE-----	94. 5
Navy Bureau of Yards & Docks-----	80. 7
Navy Ordnance-----	68. 4
Navy Aeronautics (public works)-----	47. 4
Navy Aeronautics (equipage)-----	60. 2
Marine Corps-----	91. 8
Ordnance Department-----	100. 0
United Kingdom-----	65. 5
Australia-----	38. 0
New Zealand-----	85. 5

Like construction machinery, landing mats consumed large quantities of steel.<sup>26</sup> Despite the urgency which had characterized their development, requirements for landing mats were at first not large. In its original Class IV stockpile list, O&T recommended purchase of only 6,000,000 square feet. Early in February 1942, the Engineers and Air Forces agreed on a minimum of 15,000,000 square feet. Thereafter demands increased rapidly. By midsummer the total required production of pierced plank mat was at 180,000,000 square feet—an amount that would consume from 70,000 to 100,000 tons of steel per month or about one third of the nation's sheet capacity. Even with the AA-1 ratings they had, the producers of landing mat could not buy up this amount of steel. On 19 August WPB's Iron and Steel Production Branch told the Engineers it had no idea how much steel would be released to these producers. What saved the situation was a cutback in November, mainly in Navy requirements, to 130,000,000 square feet. Deliveries for the year slightly exceeded this amount.<sup>27</sup>

In comparison with the amounts of construction machinery and landing mat the number of bridges and boats required by

the Engineers was small. Important as the steel treadway bridge was to become in the European theater, only 36 were slated for delivery in 1942. Requirements for other bridges varied from 44 H-10's to 150 Bailey's. Yet among them the H-20 was the only one delivered in the quantity desired. Here again shortages of raw materials—aluminum, plywood, and rubber, as well as steel—were the main reason for slippages in the program. Production of boats and pneumatic floats was generally satisfactory, although deliveries of storm boats fell behind because of lack of engines. On the basis of dollar value, procurement of boats and bridges reached 90.3 percent of the amount programed for them, but only because some items were delivered ahead of schedule. (*Table 8*)

In their attempt to procure precision instruments the Engineers ran into shortages of aluminum and brass, and in pressing for increased allotments of these materials encountered a "have-to-be-shown" attitude on the part of WPB that all possible substitutions had been made. The Engineers insisted that the W. and L. E. Gurley Company, the only firm having facilities for mass

<sup>25</sup> Memo, Hassinger for Capt G. E. Mumma, Chicago Engr Proc Dist Office, 19 Oct 42, sub: Tracklaying Tractor Shipments and Rqmts. Proc Div file, WD Conf Group for Tractors and Cranes, 1942.

<sup>26</sup> Unless otherwise noted, the remainder of this section is based upon: (1) MPR, Sec. I, Dec 42; Sec. VI, Nov 42; (2) Corresp in Exec Office Proc Div file, ASP; Mgt Br Proc Div file, Dierdorf Read File; and (3) CE Conf No. 3, 21 Jan 43, in EHD files.

<sup>27</sup> (1) Memo, AC of O&T Br for C of Sup Div, 22 Dec 41, sub: Rev of Engr Rqmts List. 400.12, Pt. 109. (2) 1st Ind, 5 Feb 42, on Memo, C of Sup Div for AC of Air Staff A-4, 27 Jan 42, sub: Rqmts for Landing Mat. EHD files. (3) ASP, Sec. I, 12 Nov 42. (4) Tel Conv, Larry Miller, I&S Prod Br WPB, and Seybold, 19 Aug 42. Mgt Br Proc Div file, Landing Mat, Airplane 1 (C).

TABLE 8—MISCELLANEOUS EQUIPMENT ANNUAL REQUIREMENTS AS OF DECEMBER 1942  
AND ACTUAL DELIVERIES IN 1942

Item	Requirements as of December 1942	Deliveries During 1942	Over or Short
<i>Boats</i>			
Assault, M-2, without paddles or canvas bag.....	11,919	14,680	+2,761
Reconnaissance, pneumatic, canvas, 2-man, without paddles.....	3,625	5,639	+2,014
Storm, plywood.....	1,490	1,131	-359
Utility, gasoline powered, 18-foot.....	324	449	+125
Motor, outboard, with chest and spares, 50 to 55 hp.....	1,490	18	-1,472
<i>Bridges</i>			
Fixed steel			
Panel, Bailey type, M-2.....	150	33	-117
Box girder, H-10.....	44	36	-8
Box girder, H-20.....	50	52	+2
Ponton, steel			
10-ton.....	a 00	50	+50
25-ton b.....	100	45	-55
Raft, infantry support.....	1,037	456	-581
Treadway, steel.....	36	26	-10
<i>Mapping Equipment</i>			
Compasses			
Lensatic, luminous dial, liquid filled, 5 degree, 20 mil graduations (thousands).....	266	205	-61
Watch (thousands).....	569	537	-32
Level, engineer, with tripod.....	629	937	+308
Reproduction equipment			
Topographic company, corps.....	21	15	-6
Topographic battalion.....	9	5	-4
Topographic company, Air Force Headquarters company.....	18	5	-13
Topographic company, aviation.....	0	0	-
Stereocomparagraph.....	114	130	+16
Stereoscope, magnifying mirror, with binoculars and case.....	3,009	3,480	+471
Transits, engineer			
Night illumination, 1-minute reading, with accessories and tripod, Type I.....	1,850	1,604	-246
Night illumination, 20-second reading, with accessories and tripod, Type II.....	1,628	840	-788
<i>Searchlights</i>			
60-inch.....	3,926	1,222	-2,704
24-inch.....	264	168	-96
<i>Landing Mat</i>			
Steel, pierced-plank type (thousand square feet).....	130,000	141,000	11,000
Other types (thousand square feet).....	130,000	14,680	11,680

a Dropped in November when the bridge, M-3, pneumatic, was adopted.

b Procured as complete bridge sets during 1942. Thereafter components were procured and then assembled. Tables 12 and 15 show data for components rather than complete bridges as above.

Source: (1) ASP, Sec. I, 12 Nov 42. (2) MPR, Sec. 1, 31 Dec 42, 31 Jan 43, 28 Feb 43. (3) Crawford and Cook, *op. cit.*, pp. 25-29.

production, had gone to the limit in devising plastic parts, a step which had resulted in saving almost two pounds of aluminum and over a pound of brass per instrument. They therefore joined with the company in welcoming an expert from WPB to help out. The expert departed "pleased" and promising he "would present the picture in a different and more favorable light to WPB."<sup>28</sup> By 9 November Gurley had been given an AAA priority on both aluminum and aluminum forgings, but it was too late to make up all of the lost production. By the end of the year a shortage of parts made of brass and bronze had also arisen at Gurley. A second manufacturer of precision instruments, the Eugene Dietzgen Company, began to accept Engineer orders in the last half of the year, but this firm had difficulty hiring skilled workers. The combined factors of materials and labor shortages caused production of one-minute transits to be 246 short of the required production of 1,850, while only 840 of the twenty-second transits were delivered against an ASP of 1,628. On the other hand, deliveries of levels came to 937 against requirements of 629.<sup>29</sup> (*See Table 8.*)

Although the development of radar was by 1944 to reduce the requirements for searchlights to zero, in 1942 the searchlight program had lost none of the urgency which had characterized it before Pearl Harbor. For 1942, required production of sixty-inch searchlights was 3,926, and anticipated needs for 1943 were still larger. To meet them the Engineers applied for permission to expand production facilities. In April, Under Secretary of War Patterson approved two loans from the Defense Plant Corporation—one for \$242,420 for machine tools for two subcontractors of Sperry Gyroscope, the other for \$2,031,136 to enable General

Electric to convert two of its plants. As it turned out, having the money did not help much. Despite frequent appeals for a higher priority rating, General Electric was unable to buy enough machine tools to produce complete searchlight units at the new plants until 1943. Even had plant operations got under way sooner it is doubtful whether the 1942 program could have been met. An attempt to save aluminum and also to create a more mobile unit led to a new design which specified pressed steel. This redesign, the retooling which it caused, and troubles in procuring high quality bearings brought about delays that could scarcely have been overcome by operation of the new plants. The delivery of only 1,222 sixty-inch searchlights in 1942 was less than a third of the quantity requested.<sup>30</sup> (*See Table 8.*)

Construction machinery, bridges, precision instruments, and searchlights were the

<sup>28</sup> (1) Ltr, C of Proc Br to C of Conserv Br WPB, 3 Nov 42, sub: Expert Advice Concerning Elimination of Aluminum From Transits. 413.72, Pt. 1. (2) Memo, AC of Dev Br for Besson, 2 Dec 42, sub: Rpt on Conf at Troy, N. Y., with Representatives of WPB, Gurley Co., and Dev Br. Topo Br, Read File.

<sup>29</sup> (1) Memo, C of Purch Unit Proc Br for C of Proc Br, 12 Jun 42, sub: Purch of Transits. Denman Personal File. (2) Ltr, C of Sched Br Chicago Engr Proc Dist to C of Proc Br, 22 Dec 42, sub: Eugene Dietzgen Co. Exec Office Proc Div file, Prod.

<sup>30</sup> (1) Memo, C of Opns Br Proc Div for ACof-Engrs for Mil Sup, 21 Jan 44, sub: Sixty-Inch Searchlights. Exec Office Proc Div file, Engr Equip Misc 3. (2) WD Staff Conf, 22 May 42, sub: Sup, Proc, and Constr Activities of CE. 337, Engrs Corps of (C). (3) Memo, CofEngrs for USW, 4 Apr 42, sub: Defense Plant Corporation Agreement of Lease with Sperry Gyroscope Co. Mgt Br Proc Div file, Sperry Gyroscope Co., Plant Expansion. (4) Ltr, Sperry Gyroscope Co. to C of Proc Sec, 19 Mar 42. Same file. (5) OUSW, Memo of Approval 296, 1 Apr 42. Exec Office Proc Div file, Gen Electric Co., Plant Expansion. (6) Ltr, Actg CofEngrs to CG SOS, 2 Dec 42, sub: Delays in Searchlight Prod. 470.3, Pt. 1.

programs that fell most seriously behind in 1942. Although shortage of loom capacity interfered with production of camouflage nets, the Engineers succeeded in meeting 81.5 percent of requirements for nets, and production of camouflage materials as a whole amounted to 95.1 percent of requirements. In the case of trailers, production almost caught up with requirements after a slow start.<sup>31</sup>

One of the most successful of the Engineer procurement programs in 1942 was that for barrage balloons, which was transferred from the AAF in March. Before 1942 nearly all barrage balloon equipment had come from Great Britain so that the AAF was only beginning procurement at the time of the transfer. The AAF for the most part had taken over British designs, and the Engineer Board continued this policy, modifying the designs to fit military characteristics desired by the Coast Artillery Corps. Thus the D-8 low altitude balloon was modeled after the British Mark VIII.<sup>32</sup>

When the Engineers took over procurement of barrage balloons, deliveries were behind. They continued so through July. Then in August barrage balloon deliveries soared to over \$35,000,000, an amount so great that the entire dollar value of Engineer procurement was raised to a new high not again reached in 1942. The barrage balloon program in 1942 met 98.1 percent of its requirements. During this time the British continued to ship balloons to the United States as reverse lend-lease. The Engineers received 3,123 balloons from Britain while purchasing 3,900 from American manufacturers. In addition to the balloons, the British supplied 807 M-1 winches and 1,011 M-2 BB-Flying Cables, while the Engineers bought 1,885 winches and 3,480 cables. Of the major components of the barrage bal-

loon set, only cables were significantly behind schedule at the end of the year, and enough of them had been delivered so that the Engineers did not believe an AAA rating necessary.<sup>33</sup>

During the year, purchases of engineer equipment had increased from approximately \$25,000,000 in January to almost \$91,000,000 in December, with the peak having been reached in August when large deliveries were made in preparation for the North African campaign and the upswing in the barrage balloon program occurred. The relation of deliveries to requirements for the major types of equipment was as follows:<sup>34</sup>

<i>Type of Equipment</i>	<i>Percent</i>
Total-----	84. 4
Searchlights-----	48. 7
Precision instruments-----	75. 1
Construction equipment-----	76. 6
Boats and bridges-----	90. 3
Camouflage materials-----	95. 1
Barrage balloons-----	98. 1
Electric lighting equipment-----	98. 1
Landing mats-----	109. 2
Water supply equipment-----	118. 2
Miscellaneous-----	207. 3

The shortages were not just on paper. As of the end of December requisitions for twenty-two major items could not be filled. (Table 9) Shortages notwithstanding, the Corps of Engineers had procured a vast

<sup>31</sup>(1) MPR, Sec. 1-A, 31 Mar 43, 30 Apr 43. (2) ASP, Sec. I, 12 Nov 42. (3) WD Conf, 28 Sep 42, sub: Engrs Prod Program Conf. 337, Engrs Corps of (C). (4) Ltr, C of Sup Div to CG SOS, 1 Jul 42, sub: Investigation of Mgt—Fruehauf Trailer Co. 095—Fruehauf Trailer Co.

<sup>32</sup> Engr Bd Hist Study, Balloons, pp. 3-4.

<sup>33</sup> Memo, C of Sup Div for File, 19 Mar 42, sub: Notes on Conf Concerning Transfer of Barrage Balloon Sup to CE. 337, Pt. 1.

<sup>34</sup> Chart, Relation of Deliveries to Rqmts, 1942, in CE Conf 3. EHD files. The percentages here given were computed by using all items included in SOS Monthly Progress Reports and will not agree in all cases with categories of equipment in Tables 7 and 8, which are not so inclusive.

TABLE 9—UNFILLED REQUISITIONS AND THE AVAILABILITY OF DEPOT STOCKS:  
DECEMBER 1942

Item	Unfilled Requisitions	Available for Issue or in Transit	Shortages	Item	Unfilled Requisitions	Available for Issue or in Transit	Shortages
<i>Boats and Bridges</i>				<i>Construction Machinery—Continued</i>			
Motor for boat, storm, plywood.....	128	0	128	Saw, chain, gasoline engine driven, 36-inch blade.....	1,411	95	1,316
Bridge, ponton, 25-ton....	42	21	21	Shops, motorized (9 types) <sup>b</sup> .....	386	69	317
Raft, infantry support....	261	10	251	<i>Mapping Equipment</i>			
<i>Camouflage Materials</i>				<i>Reproduction equipment</i>			
Nets, garnished: <sup>a</sup>				Topographic company, corps.....	13	0	13
22x22 feet.....	41,984	16,823	25,161	Topographic battalion..	4	0	4
30x30 feet.....	2,564	126	2,438	Topographic company, Air Force Headquarters company.....	13	0	13
36x44 feet.....	20,646	460	20,186	Topographic company, aviation.....	2	0	2
45x45 feet.....	3,691	47	3,644	Stereocomparagraph.....	16	0	16
<i>Construction Machinery</i>				Transit, night illumination, 20-second reading, Type II, with accessories and tripod.....	245	178	67
Compressor, air, skid mounted, gasoline engine driven, 105 cubic feet per minute.....	100	53	47	<i>Searchlights</i>			
Cranes and shovels, crawler mounted				60-inch.....	189	134	55
½-cubic yard, 5- to 6-ton, Class II.....	56	29	27	24-inch.....	168	0	168
¾-cubic yard, 7- to 10-ton, Class III.....	9	2	7				
Hammer, gasoline, portable.....	115	63	52				
Roller, road, towed type, sheepsfoot, 2-drum-in-line.....	27	7	20				

<sup>a</sup> More than enough nets were in the process of being garnished to fill the requirements.<sup>b</sup> Seventy shops were available without chassis.

Source: Table, Items on Which Stocks Available for Issue or in Transit to Storage Are Not Equal to Existing Unfilled Requisitions on Depots, 23 Dec 42. 400.12, Pt. 1 (S).

amount of matériel—\$650,623,000 worth in fact—during 1942. Included in this total was over \$61,560,000 in international aid.<sup>35</sup>

### *The Late Start in Maintenance of Equipment*

As this large quantity of equipment flowed out to American troops and Allies, the means of keeping it in running order demanded increasing attention. Providing for efficient maintenance was not simply a matter of economy in the usual sense of monetary savings. As compared with steel and shipping and production facilities, money was extremely plentiful. To replace what should be repaired was intolerably wasteful of materials, transportation, and plant. Finally and most important, lack of proper maintenance might spell failure on the battlefield.

The person who had worked longest and hardest to develop plans for the maintenance of engineer equipment was Lt. Col. C. Rodney Smith, who on 1 March 1942 was transferred from the Engineer Board and placed in charge of a newly created Maintenance Section in the Requirements, Storage and Issue Branch, Supply Division. Although the recommendations made by Smith for the activation and training of a large number of maintenance troops in the summer of 1941 had been declared “grandiose” and had not been put into effect, the fact is that the research and experimentation Smith had directed while at the Engineer Board had answered many basic questions about this hitherto neglected segment of engineer supply. Smith arrived at OCE prepared to give general direction to a program he was largely responsible for formulating.<sup>36</sup>

This program had its base in the echelon

system of maintenance established by the Army. First echelon maintenance was the responsibility of the operator of the equipment concerned. It consisted of running the machine properly, cleaning and oiling it regularly, making minor adjustments, and replacing parts that wear out rapidly such as tires, fan belts, and cutting edges. Such spares as well as common tools went with the machine. Second echelon maintenance was to be accomplished within the troop units by personnel specially trained for coping with minor breakdowns. All major engineer units were equipped with a full range of hand tools, commonly used wrenches and sockets, a 10-ton hydraulic press with accessory attachments, portable power drills, power grinder, and welding sets, and kept on hand a supply of frequently replaced parts and minor subassemblies such as carburetors, clutches, and brakes. The engineer maintenance company, previously called the mobile shop company, was responsible for third echelon maintenance in the field. Its T/O called for 6 officers and 175 enlisted men comprising a headquarters platoon, a contact platoon to make on-the-spot repairs, and two maintenance platoons which were to fix equipment requiring evacuation to the platoon or company bivouac. The maintenance companies were supplied with light mobile repair shops—most of which had been developed by the Engineer Board with the expert assistance of the Couse Laboratories, Incorporated, of Newark, New Jersey—as well as major unit assemblies and spare parts necessary for complete field overhaul. Fourth echelon maintenance, including general overhaul, recla-

<sup>35</sup> (1) Crawford and Cook, *op. cit.*, p. 15. (2) ASF Stat Review.

<sup>36</sup> (1) Ltr, Smith to Lt Col A. MacMillan, 17 Mar 42. 400.312, Pt. 6. (2) See above, pp. 35–36.

mation, salvage, rebuilding, and reconditioning, was the responsibility of the heavy shop company, a unit of 6 officers and 193 enlisted men organized into a headquarters platoon, a manufacturing platoon, and a repair platoon. The heavy shop company would perform most of its work at a fixed installation such as a field depot, but it had some mobile shop facilities also.<sup>37</sup>

The dovetailing of skills and supplies upon which this system of maintenance depended was extremely difficult to achieve. Operators trained under the shortened programs of 1942 caused more than the normal number of breakdowns and multiplied the need for repairs. Given time, this situation was bound to improve. The training of an operator did not stop with the completion of this specialist course. He went on to gain experience and skill. The threat to the efficiency of engineer maintenance was much greater from defects in the supply system than from shortcomings in training.

In order for the various maintenance echelons to keep engineer equipment running they had to have on hand a supply of spare parts sufficient in kind and in quantity. The key to assuring sufficiency in kind and to a large degree in quantity was to standardize on a single make and model of a given type of equipment. Failure to standardize meant that depots at home and overseas, maintenance companies, and heavy shop companies would be compelled to stock many more parts. Identification, segregation, and issue of all these spares would probably be complicated beyond the capabilities of the personnel distributing them. Achieving balanced stocks would be vastly more difficult. Suppose it happened that shovels of a particular make and model got unusually hard usage. A shop company might find itself stocked with plenty of

spares for another make of shovel but not enough to go around for those in need of repair.

For the limited number of special military items they procured, the Engineers were in much the same position as the Ordnance Department in ordering a rifle. All rifles of a certain caliber were manufactured according to a standard specification. So were all treadway bridges. But most engineer equipment was "commercial" rather than "military." With few exceptions the Supply Division was inclined to buy various kinds of shovels and other types of construction machinery instead of standardizing upon one make and model. Three factors encouraged this practice. One of these factors—competitive bidding—although persistent, was the most readily modified. With advertising for bids out for the duration, it required but a firm stand from those in authority to impress upon procurement officials the necessity for ordering the exact make and model specified. Another of these factors—the freedom allowed commanders overseas to requisition whatever make or model they happened to prefer—was somewhat more difficult to control. Overseas commanders could scarcely be blamed for ordering blind. A new Class II Engineer Supply Catalog had been issued early in 1942, but for Class IV items not listed on the T/BA they had only Sears, Roebuck and Montgomery Ward catalogs and their own past experience to look to in making up a requisition for equipment. Moreover these requisitions were edited by the Operations

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<sup>37</sup> (1) Ltr, C of Sup Div to COs Engr Orgns *et al.*, 23 May 42, sub: Engr Maint and Sup of Spare Parts. 400.4. (2) Engr Bd Hist Study, Engr Maint Equip. (3) TO&E 5-357, 1 Apr 42, 7 May 42. There were five maintenance echelons by the end of the war.

and Training Branch of the Troops Division which was inclined to supply the theater Engineer with exactly what he asked for on the time-honored theory that the man on the spot knows best and that failure to accomplish missions may heap recriminations upon those who had not acceded to his wishes. But by far the most compelling factor operating against the standardization of engineer equipment was the tremendous demand for construction machinery which dictated the utilization of all facilities. Perhaps it would have been possible to overcome the natural reluctance of competitors to share their drawings and manufacturing processes in order to produce a standard model. Such a step was far from practical in 1942. The WPB estimated it would take close to six months for tractor manufacturers to retool; meanwhile all production would have stopped.<sup>38</sup>

An alternative to standardization was a concentration of particular makes and models within using organizations. On 16 April 1942, six weeks after Smith's arrival in OCE, the Supply Division announced its intention to promote this type of standardization to the maximum:

Except in extreme cases, only one make and model of any one type of power equipment should be procured in the future. . . . The practice of "splitting" orders for mechanical equipment among various firms should be stopped completely, except when the replacement parts for such equipment are interchangeable, or when vitally urgent delivery dates cannot otherwise be met to any reasonable degree. Manufacturers should be prevented from changing models, using different sub-assemblies, bearings, clutches, carburetors, etc., except under extreme conditions of necessity.<sup>39</sup>

As a first step in support of this policy the Requirements Branch would prepare a list of major items of equipment giving the

quantity of each make and model on hand and on order. Representatives of the Procurement and Development Branches would go over this list and recommend a standard make and model for each item. The Procurement Branch would see that manufacturers "froze" their models. Procurement of other than standard equipment—"in cases where adherence . . . is impossible, or will not meet urgent delivery requirements"—would have to be approved by the executive officer of the Supply Division.<sup>40</sup>

Action within the Supply Division to put this directive in effect was slow. One month to the day after its issue the chief of the Purchasing Unit of the Procurement Branch wondered what progress was being made. "If this program is to be carried to the maximum degree of efficiency," he wrote, "it is believed that the list should be forthcoming as we are continuing to obtain requisitions for various types of equipment and there appears to be no definite progress as yet on standardization except for a few items."<sup>41</sup> Even on these few items confusion existed between the Requirements and Procurement Branches. There seemed so many more important things to do that summer—taking over the procurement of tractors, getting the common stockpile set up, adjusting

<sup>38</sup> (1) Maj Harry F. Kirkpatrick, Dev of Sup Plan for Engr Class IV Sup (typescript), 20 Dec 45. EHD files. (2) Memo, Secy MAC(G) for Chm MAC(G) [c. 8 Apr 42], sub: Tracklaying Tractors, Long Range Allocs for Approval (Not Asgmt). Intl Div file, 451.3 Alloc. (3) Ltr, AC of Intel Br to TAG, 4 Feb 42, sub: Cablegram to C of SPOB, London. 400.34, Pt. 40.

<sup>39</sup> Memo, Actg C of Sup Div for Br Cs of Sup Div, 16 Apr 42, sub: Standardization of Engr Equip. Exec Office Proc Div file, Proc Dists.

<sup>40</sup> *Ibid.*

<sup>41</sup> Memo, C of Purch Unit Proc Br for AC of Proc Br, 16 May 42, sub: Standardization of Engr Equip. Denman File, Misc.



to a new system of raw materials allocation, struggling to equip newly activated units and task forces. Not until 3 August was Smith able to send "tentative preliminary" standardization data sheets to the Engineer Spare Parts Branch of the Columbus General Depot which had taken over the preparation of spare parts lists.<sup>42</sup>

Shortly after arriving in OCE Smith had called a meeting of Washington representatives of the principal manufacturers of engineer equipment, seeking their help in setting up a nucleus of experts for manning the Spare Parts Branch. He felt most fortunate in having persuaded Raymond L. Harrison of the Harrison Equipment Company of Albuquerque, New Mexico, to accept a commission and to become head of the branch. Harrison in turn persuaded literally hundreds of experienced persons to leave their businesses and come to Columbus. Smith had the utmost confidence in the abilities of Harrison and his group, and thus deplored the more the delays in standardization.<sup>43</sup>

It was 30 October before the publication of the list of standard makes and models contemplated in the 16 April directive. As finally issued, it sounded as if the Supply Division meant business. No deviation was to be made without the approval of its executive officer. Requests for such deviation were to be submitted only if there was no possibility of adjusting requirements to the manufacturer's ability to produce, the standard make and model could not be obtained in time to meet an urgent requirement, there was no possibility of increasing production, or if the standard item had given unsatisfactory service. On 21 November the Supply Division published a list of Standard Components of Standard Makes and Models. Manufacturers would be re-

quired to adhere to this list in the installation of magnetos, axles, clutches, brakes, and the like in the machines ordered for engineer use.<sup>44</sup>

Although much of the success of the drive for standardization depended upon the Operations and Training Branch of the Troops Division, which drew up requisitions for task forces and edited requisitions from overseas, this office was naturally not compelled to comply with orders issued by the chief of the Supply Division. On 7 November the Requirements Branch forwarded a copy of the 30 October directive to O&T with a request that future requisitions specify only standard makes and models. If any deviation were necessary the reasons should be stated. On 25 November, with requisitions for nonstandard items still being received, the executive officer of the Supply Division felt compelled to address a somewhat stronger plea for co-operation to the chief of O&T.<sup>45</sup>

Whether or not his arguments in favor of standardization would eventually prevail

<sup>42</sup> (1) Memo, Actg C of Proc Br for C of Rqmts Br, 2 Jul 42, sub: Standardization of Equip, Requisition E-1587. Rqmts Br file, Standardization of Engr Equip. (2) Memo, C of Maint Sec for Equip Control Sec, 7 Jul 42, same sub. Same file. (3) Ltr, C of Maint Sec to Engr Sup Off Columbus Gen Depot, 3 Aug 42, sub: Standardization Data Sheets for Establishing Spare Parts Lists and Depot Stocks. 400.291, Columbus Gen Depot, Pt. 3.

<sup>43</sup> Interv, Brig Gen C. Rodney Smith, 6 May 55.

<sup>44</sup> (1) Ltr, C of Sup Div to All Brs Sup Div OCE *et al.*, 30 Oct 42, sub: Standardization of Engr Equip, with Incl. 475, Engr Equip, Pt. 1. (2) Ltr, C of Sup Div to All Brs Sup Div OCE *et al.*, 21 Nov 42, sub: Standardization of Engr Equip, with Incl. Sup Div file, 400.34, Standard Components.

<sup>45</sup> (1) Memo, C of Opns Sec Rqmts Br for O&T Br, 7 Nov 42, Sub: Standardization of Engr Equip. Rqmts Br file, Standardization of Engr Items. (2) Memo, Exec Office Sup Div for C of O&T Br, 25 Nov 42, same sub. Same file.

they could certainly not affect the situation immediately. Six months of continuing to buy a variety of makes and models had intervened since the policy of standardization was first announced. And six months of buying in the quantities being purchased in 1942 resulted in the entrance of extremely large amounts of equipment into the Engineer supply system.

As if the continued purchase of different makes and models of new equipment were not sufficient harassment to Smith and his assistants, there was added the even more serious worry caused by the possibility that much secondhand machinery would have to be issued to troops. In April 1942 the Supply Division received \$25,000,000 earmarked for the purchase of secondhand machines from sources such as state and municipal highway departments, for example. After the military construction program reached its peak in July, the Supply Division began to be urged to take over machinery no longer needed in building camps, airfields, and munitions plants. Clay wanted to tap this source for the common stockpile. That this machinery was already owned by the government was the least of the several attractive aspects of the scheme. Its main appeal lay in the fact that the machines were readily available, or about to be made available, at the very time when production was far short of requirements. Its disadvantages were readily apparent to those concerned about keeping the equipment in operation.<sup>46</sup>

In opposing the introduction of secondhand machinery into the military supply system, the Supply Division could argue from experience. Of the \$25,000,000 available, only about \$2,000,000 had been spent. A halt had been called after what had been bought was found unsuitable. From Aus-

tralia where secondhand machines had been sent in the urgent days following the fall of the Philippines came reports of dissatisfaction. Eight tractors received there had proved to be in such poor condition that they should have had a complete overhaul, but the supply of spare parts was too low to permit this. Consequently they were patched up and made to run, although not efficiently. According to an inspection report, the theater had come to prefer delay to the shipment of used machines.<sup>47</sup>

Yet SOS and WPB could not be convinced. The Construction Division, OCE, had about \$95,000,000 worth of machinery less than eighteen months old and was predicting early in September that by November it could begin to turn over large quantities to the Supply Division. By late September the WPB was referring to \$20,000,000 worth of machinery which the Construction Division was about to declare surplus. Hassinger, fearful of the consequences of such an understanding, expressed his skepticism as to the amount that might be made available in view of new construction projects just assigned, but he came away from a conference at WPB discouraged and deploring the absence of understanding there about the necessity for standardization of troop equipment. By mid-October, Hassinger felt his apprehension justified on all counts. On the 30th of September he learned that new tractors that had been supposed to come to troops as a result of the tapering off of the military construction program were to be al-

<sup>46</sup> (1) 1st Ind, 15 Sep 42, on Memo, ACofS for Materiel SOS for CofEngrs, 11 Aug 42, sub: Survey of Heavy Constr Equip. 413.8, Pt. 13. (2) Memo, C of Intl Sec for C of Rqmts Br, 4 Sep 42, sub: MAC Meeting, 3 Sep 42. Intl Div file, 334, Munitions Asgmt Comm.

<sup>47</sup> (1) Ind cited n. 46(1). (2) Memo, C of Sup Div for ACofS for Materiel SOS, 21 Oct 42, sub: Reduction in Prod of Tractors, with Incl. 451.3.

located to the Construction Division after all. When the WPB cut the raw materials allocation so drastically for the fourth quarter, he attributed this action to the notion prevailing in WPB that the Supply Division would have received and would be able to use large quantities of secondhand machinery. On 21 October, Fowler entered a strong protest with Clay against the cut and against the idea of sending used equipment overseas. The cut was not restored. The Supply Division was resigned by this time to issuing some of the surplus machinery for troop training in the United States and by the end of November was discussing a program for reconditioning it with representatives of the Construction Division. There is scarcely room for doubt that shipments of secondhand machinery overseas remained the exception rather than the rule during the year 1942 not because the logic of maintenance staffs had prevailed but because the Construction Division was not in a position to declare much of it surplus. It was fortunate that the Corps was afforded this period of grace. Varied as were the machines issued, they were for the most part at least new. By the time the Construction Division was in a position to release substantial numbers of machines, supplies had become more plentiful.<sup>48</sup>

In as much as standardization was basic to an efficient maintenance system the Corps of Engineers could not hope to approach perfection. But lack of standardization was not the sole cause of weakness in the maintenance program. While the Supply Division had been conscious all along of the need to furnish enough parts for all echelons of maintenance, it was not until late in July that a comprehensive system was arrived at. Under the terms of the July directive, manufacturers of engineer equipment were to state the make and model of the machine

they were supplying and the make and model of all its components, assemblies, and accessories, and to furnish catalogs of spare parts. The information furnished by the manufacturer was to be used by the Spare Parts Branch of the Columbus General Depot to draw up lists of spare parts for standard items of equipment and by the Maintenance Section, OCE, to prepare similar lists for nonstandard equipment. All specifications would henceforth include first echelon sets of spare parts which would be delivered by the manufacturer along with the machine. In addition, each contract would carry an order for an eighteen months' supply of parts for second, third, and fourth echelon maintenance. Delivery of second, third, and fourth echelon spares need not coincide with delivery of each machine but was to be scheduled in balanced lots. Thus 20 percent of all spare parts should parallel the delivery of 20 percent of the equipment; another 20 percent of spares should be ready by the time 40 percent of the machines had been delivered. Spare parts would carry the same priority as the main order.<sup>49</sup>

<sup>48</sup> (1) Hassinger Diary, 9 Sep, 29 Sep, 30 Sep 42. (2) Memo, C of Sup Div for ACofS for Materiel SOS, 21 Oct 42, sub: Reduction in Prod of Tractors. 451.3. (3) Opns Sec Rqmts Br Diary, 21 Nov 42.

<sup>49</sup> (1) Memo, C of Sup Div for All Br Cs Sup Div, 25 Jul 42, sub: Standard Procedure for Requisitioning Spare Parts With New Equip. Exec Off Proc Div file, Proc Dists. (2) Ltr, C of Maint Sec to Engr Sup Off Columbus Gen Depot, 22 Jul 42, sub: Priorities for Proc of Spare Parts. 400.1301, Pt. 6.

The eighteen months' supply was subsequently reduced to twelve and the delivery schedules were also modified somewhat. See (1) Ltr, C of Sup Div to Br Cs Sup Div *et al.*, 23 Oct 42, sub: Standardization Procedure for Requisitioning Spare Parts With New Equip. Exec Office Proc Div file, Proc Dists; and (2) Same to Same, 8 Dec 42, sub: Rev Standardization Procedure for Requisitioning and Purch Spare Parts With New Equip. 460, Pt. 1.

To include an order for spare parts in the original contract the procurement organization had to receive the appropriate list of spare parts promptly either from Columbus or from the Maintenance Section, OCE. The implication in the July directive was that Columbus could make lists for standard equipment available immediately. The Maintenance Section was allowed fifteen days to prepare lists for non-standard equipment. Late in October the Spare Parts Branch at Columbus took over the preparation of lists for both standard and nonstandard equipment and was given ten days after receipt of a requisition in which to draw them up.<sup>50</sup> Neither the Maintenance Section nor the Columbus Spare Parts Branch kept abreast of this work. In September the chief of the Purchase Section, Procurement Branch, claimed his office had "never received a requisition in which the list of depot spare parts was available at the time the requisition was submitted." In December he noted that lists of spare parts for standard equipment were not yet available.<sup>51</sup> Smith could see for himself that the Columbus Spare Parts Branch was all too often taking much longer than ten days to forward spare parts lists to the procurement districts. Failure to follow through on the policy of standardization, insufficient data from manufacturers, noncompliance with routine procedures, inexperienced personnel, and not enough personnel were, he felt, the main reasons for delays. "By no means should any one agency be blamed, especially not the Columbus Spare Parts Branch, which has performed a miracle of accomplishment. At the same time, the most vigorous ACTION must be taken to get this huge job straightened out and on a clear track AT ONCE," he concluded in December 1942.<sup>52</sup>

Lag though the program did, the quantity of spare parts placed on the order books was tremendous. It was so large in fact that manufacturers could not believe it represented a real need. The Maintenance Section could understand their skepticism. Under normal peacetime conditions of operation and ready access to dealers' stocks, the Maintenance Section figured a construction machine costing \$2,500 would require approximately \$750 worth of spare parts for eighteen months' maintenance. Under wartime conditions, with no dealers' stocks to fall back upon, \$2,000 worth of parts were required.<sup>53</sup>

<i>Requirement</i>	<i>Value</i>
Total -----	\$2,000
Actual use of parts-----	750
Overseas depot stock-----	250
Impounded in transit-----	375
Estimated shipping losses-----	250
Domestic depot stock-----	375

Incredulity was not confined to the manufacturers. Hassinger himself was amazed to learn from the Maintenance Section in September that \$12,000,000 worth of spare parts was required from the Caterpillar Tractor Company for engineer troop use. "This figure could not be produced in a reasonable time," he recorded in his diary, "even if we stopped producing tractors . . ." <sup>54</sup>

<sup>50</sup> Ltr, C of Sup Div to Br Cs Sup Div *et al.*, 23 Oct 42, sub: Standardization Procedure for Requisitioning Spare Parts With New Equip. Exec Office Proc Div file, Proc Dists.

<sup>51</sup> (1) Memo, Denman for Actg C of Proc Br, 3 Sep 42, sub: Comments on Procedure for Requisitioning Spare Parts With New Equip. Denman file, Proc of Spare Parts. (2) Memo, Denman for Seybold, 15 Dec 42, same sub. Same file.

<sup>52</sup> Maint Sec Diary, 24 Dec 42.

<sup>53</sup> Notes, Bunting, Maint Sec for Record, [c. Oct 42]. Constr Mach Br Proc Div file, Spare Parts Subcomm.

<sup>54</sup> Hassinger Diary, 15 Sep 42.

Such large orders for spare parts were bound to compete with new equipment for production facilities. The conflict was noted shortly after the middle of August. On the 17th of that month Smith received instructions from Fowler to begin shipments of spare parts at once for the build-up in Britain. Smith explained that Columbus was assembling stocks for this purpose but that he had instructed the depot to fill the back orders for other theaters also. If he struck this balance, shipments to England could not begin for several weeks. Fowler insisted that some parts be shipped immediately and that no shipment be delayed pending the assembly of fully balanced stocks. Columbus had already been directed to reduce procurement of spare parts from an eighteen months' to a twelve months' stock level. The executive officer of the Engineer Section at Columbus advised Smith to get an AAA priority or curtail the production of new machines if he wished to catch up on the backlog.

Fowler was not prepared to go this far. Efforts would be made to obtain more materials for spare parts, for lack of materials was recognized as the real bottleneck.<sup>55</sup> Whenever Columbus found deliveries of spare parts blocked by orders for new equipment, the case was to be referred to OCE "where the relative needs for spare parts and new equipment can be compared and a decision made as to whether equipment deliveries will be deferred, or whether we must go without spare parts."<sup>56</sup> On 29 August the Procurement Branch notified inspecting officers of the production preference to be accorded where orders for spare parts themselves were in competition. Delivery of spare parts called for on the original order for new machines would take precedence over all but those "comparatively

small orders for spare parts" to be made by Columbus for shipment directly overseas.<sup>57</sup> On 29 October priorities for the production of spare parts were spelled out in more detail:

a. Spare parts orders placed by any procurement office for consignment direct to Ports of Embarkation.

b. Spare parts orders placed by any procurement office for consignment direct to troops or other military projects (such as Alaska) but not via Ports of Embarkation.

c. Spare parts furnished integrally with new machines as "first echelon" or "field" sets. This priority applies *only* to the first echelon and field sets of spare parts actually accompanying new machines. Depot stocks being procured concurrently with new machines will be given the lower priority shown in subparagraph *e* below.

d. Spare parts orders placed by the Engineer Supply Officer, Columbus Quartermaster Depot . . . for delivery to Columbus.

e. Spare parts orders for Columbus Depot stocks procured concurrently with new machines on purchase orders placed by any procurement office.<sup>58</sup>

Stocks of spare parts for second, third, and fourth echelon maintenance from which Columbus was supposed to supply engineer organizations all over the world got the lowest priority.

Meanwhile the trail of woes attendant upon a multiplicity of makes and models and the failure to issue spare parts along with equipment had become apparent in

<sup>55</sup>(1) Maint Sec Diary, 17 Aug, 24 Aug, 25 Aug 42, 12 Nov 42. (2) Ltr, C of Maint Sec to Engr Sup Off Columbus Gen Depot, 14 Aug 42, sub: Spare Parts Orders. 400.291, Pt 8.

<sup>56</sup>Ltr cited n. 55(2).

<sup>57</sup>Ltr, AC of Proc Br to Inspec Offs, 29 Aug 42, sub: Spare Parts Orders, CE Equip. 475, Engr Equip, Pt. 1.

<sup>58</sup>Ltr, C of Sup Div to Engr Proc Dists *et al.*, 29 Oct 42, sub: Relative Priorities for Expediting Delivery of Spare Parts Orders. 475, Engr Equip, Pt. 1.

the European Theater of Operations (ETO). When Smith visited the ETO in September, there were practically no spare parts left. The only parts received until shortly before his arrival had been small stores brought along with organizational equipment. Now the first shipments which should have gone out months before had begun to appear. Smith planned to build up stocks of spare parts as fast as possible to provide for approximately a year's maintenance and to keep them at that level by constant replenishment. In the beginning this would be most difficult to accomplish, Smith warned:

Because of the lack of standardization in existing Engineer equipment, efficient spare parts supply from the U. S. to the theater, and from the theater depot to troop organizations, can be maintained only if an up-to-date record is kept of the make, model and serial numbers of all Engineer machines in the theater and transferred from this theater to other theaters. As equipment is sent from this theater to other theaters, and as new equipment is received in the theater, these records must be brought up to date promptly. Otherwise it will be impossible to maintain proper depot stocks of spare parts, prepare replenishment requisitions, or adjust maximum stock level requirements for respective machines.<sup>59</sup>

Gradually, if the new policy of standardization were adhered to, nonstandard equipment should be squeezed out of the supply system. Very limited amounts of spare parts were to be stocked for nonstandard items. Standard equipment would be assured of spare parts from balanced depot stocks in the United States and overseas.<sup>60</sup>

Suddenly there appeared to be too many "ifs" and "buts," too many plans, too few results, to suit higher authority. On 2 November, Fowler called Smith to his office and told him that Somervell was displeased. Spare parts must be procured with all new

machines and be shipped with the machines overseas. Accordingly Reybold had directed that "spare parts problems be solved forthwith." Smith could not promise to make good so soon. Strict adherence to standardization and to the procedures for procuring spare parts would, he assured Fowler, "pave the way toward satisfactory long-pull results." But he admitted that "the immediate situation was very unsatisfactory, in fact, critical," and predicted that in the best of circumstances it would remain so for at least two or three months.<sup>61</sup>

Smith's description and forecast can be applied to all phases of engineer supply at the end of 1942. Statements of requirements were far from accurate. Production continued to lag. Shipments were behind schedule. In the Southwest Pacific, engineer supplies had reached but 50 percent of the required level, even though here as in the British Isles substantial quantities of matériel had been furnished through reverse lend-lease. Engineer headquarters in the ETO had expected 75,000 cargo tons of matériel during the summer months alone. Only 75,400 tons were received during the entire year. Although in the last six months of 1942 shipments to this theater were much larger than previously, much of the equipment received was diverted to the campaign in North Africa. Heavy machinery needed for the large construction program under way in the United Kingdom was still in short supply in December. Class II equipment had not arrived in sufficient quantity

<sup>59</sup> Ltr, C of Maint Sec to Engr SOS ETO, 22 Sep 42, sub: Maint of Engr Equip in ETO. Intl Div file, 400.314.

<sup>60</sup> (1) *Ibid.* (2) Memo, ExO Sup Div for C of O&T Br, 25 Nov 42, sub: Standardization of Engr Equip. Rqmts Br file, Standardization of Engr Items.

<sup>61</sup> Maint Sec Diary, 2 Nov 42.

to meet current demand much less maintain the sixty-day stock level authorized.<sup>62</sup>

The failure of supplies to reach the theaters in desired quantities was as much the result of the scarcity of cargo ships as of insufficient production. The shortage of shipping was at least in part traceable to the shortage of steel. It was a characteristic of 1942 that such limiting factors in production and distribution fed upon each other and swelled the total difficulty. Thus the shortage of steel and of industrial plants caused tractor manufacturers to steal from their spare parts bins in an attempt to increase production of complete machines.<sup>63</sup>

In view of the difficulties encountered, the 1942 record was impressive. Deliveries of goods reached unprecedented levels.

Equally significant were the administrative arrangements, born of confusion and shortages, which would make for smoother operation in the future. Centralized procurement of tractors and shovels and cranes, the creation of the common stockpile—both innovations—were to bear the test of time. In the production of Engineer matériel as in the provision of Engineer officers and enlisted men, 1942 was the crucial year, the year of greatest challenge to the Corps in the United States.

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<sup>62</sup> (1) *Engineers of the Southwest Pacific*, Vol. VII, *Engineer Supply*, pp. 19–32, 41. (2) Information from historians preparing volumes on the Corps of Engineers in the War Against Japan, and in the War Against Germany.

<sup>63</sup> (1) Leighton and Coakley, *op. cit.*, p. 202 ff. (2) Opns Sec Rqmts Br Diary, 17 Dec 42.